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BAG HANDLE AND METHOD AND MEANS OF ATTACHMENT

Introduction

The present invention relates to an apparatus for attaching a handle to a bag, and to a method of attaching a handle to a bag, in particular, but not only, to shopping bags with flexible cord handles.

Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

Description of the Prior Art

One type of bag relevant to the field of this invention, has a pair of flexible cord handles which pass through apertures in the bag, the free ends of the handles being tied to prevent disengagement of the handle from the bag. The flexible cord handle is comfortable to use, provides an aesthetically pleasing, high quality product and is easier to pack than rigid handled bags since the flexible cord will drape downwardly on bag when not in use.

Connecting such handles to the bag wall itself, however, creates certain difficulties. Normally the handle is manually passed through the apertures adjacent to the open upper end of the bag and the free ends tied in knots to prevent the handle from disengaging from the bag. This is a slow, expensive and labour intensive process, particularly if the handle is produced from a woven cord which has very little rigidity in the axial direction. Further, the possibility of human error cannot be discounted and if the knots are improperly tied, the handle may disengage from the bag altogether leading to damage of the bag contents.

Handles are also known to be fitted to bags via adhesive strips which makes their security dependant on the adhesion and tearability of the strip and/or bag.

The present invention is also concerned with subject matter disclosed in WO97/48550 and the contents of the specification of that published International patent application are also incorporated herein by reference.

In the art of bag manufacture and with particular regard to the application of flexible handles to bags as discussed in the aforementioned specifications, the mechanisation and automation of applying such handles has been highly desirable but hitherto unavailable. Apparatus which automates the manufacture of bags of the type depicted in Fig 1 of WO97/48550 have been in use for many years. The output of such equipment being a completed bag without handles attached which are later added to the bag by a manual operation. WO97/48550 discloses a method and means for integrating the application of handles to bags by eliminating manual handling.

Summary of the Invention

The present invention provides a method and apparatus for attaching flexible cord handles to bags or other receptacles which offers a useful alternative to known arrangements.

In a first aspect, the present invention provides a method for attaching a flexible cord handle to a bag comprising the steps of:

forming at least one aperture through a bag wall;

passing an end of a cord, having an aglet thereon, through the at least one aperture in the bag wall;

providing at least one obstruction member with at least one cord receiving cavity therein adapted to receive the aglet of at least one cord;

inserting the aglet into the cord receiving cavity of the obstruction member so that the aglet is located at least partially within the cavity; and

bonding the aglet to the obstruction member.

In another form of this first aspect of the invention there is provided a method for attaching a flexible cord handle to a bag comprising the steps of:

forming at least one aperture through a bag wall;

passing an end of a cord, having an aglet thereon, through the at least one aperture without substantially deforming said aglet; and

shaping the aglet to form an obstruction member which cannot pass through the aperture.

The size of the aperture formed through the bag wall is preferably only marginally larger than the largest transverse cross-sectional dimension of the aglet.

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The obstruction member provided in accordance with the above method may be of many different forms. For example, the cord receiving cavity within the obstruction member may pass entirely through the obstruction member. In such embodiments, the aglet may be positioned some distance away from the end of the cord, and the cord may be passed through the obstruction member until the aglet is located at least partially within the obstruction member. Such an embodiment would provide a length of cord protruding from the obstruction member which may be aesthetically desirable or serve some further useful function.

In other embodiments the obstruction member may provide advertising, for example a company logo printed on the exposed side of the member, or the member may be shaped for the purposes of advertising.

The step of bonding the aglet to the obstruction member may be performed by sufficiently heating some or all of the obstruction member to cause said bonding. In some embodiments, the step of heating the obstruction member may be performed using microwave heating techniques. In cases such as this the heating preferably occurs only within a small part of the obstruction member close to the aglet. Such a technique may be desirable for the purposes of speed, efficiency of production, or to minimise heat damage to the cord or aglet.

Alternatively, bonding between the aglet and the obstruction member may be effected by the use of an adhesive.

In some embodiments of the method of the invention, the obstruction member may have dimensions such that it can pass through the aperture of the bag. In such embodiments, the step of bonding the obstruction member to the aglet may occur before the step of passing the cord with aglet and attached obstruction member through the aperture. In order to attach the cord handle to the bag in such embodiments the method further includes the step of:

shaping the obstruction member such that its dimensions no longer permit it to pass through the aperture.

Furthermore, in a similar embodiment the aglet itself may function as the obstruction member. In cases such as this the aglet must be of a material such that it can provide a sufficiently sturdy obstruction once it is shaped while fixed to the cord so that its dimensions no longer permit it to pass through the aperture.

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For such embodiments the step of shaping the obstruction member may be performed in such a way that the obstruction member provides advertising material or decoration, for example it may be deformed into the shape of a country or a company logo or such like.

A second aspect of the present invention provides an obstruction member for attaching a cord handle to a bag or other receptacle, the obstruction member comprising:

a cord receiving cavity adapted to engage an agleted cord;

said member being large enough, or adapted to be shaped so as to become large enough, to be unable to pass through an aperture in the bag wall; and

being of a material adapted to be bonded to the aglet.

In embodiments where the obstruction member has dimensions such that it may pass through the aperture of the bag, it must be made of a material suitable for shaping to the required dimensions to not pass through the aperture.

The cord receiving cavity within the obstruction member may be a passageway entirely through the obstruction member.

In other embodiments the obstruction member may provide advertising, for example a company logo printed on the exposed side of the member, or the member may be shaped for the purposes of advertising.

A third aspect of the present invention provides an agleted cord. The cord may be made of any suitable flexible material. The agleted cord must be able to pass through a corresponding aperture in a bag wall.

The aglet must be sufficiently firmly attached to the cord to hold the cord in place when in use as a bag handle.

The aglet may function as an obstruction member. In such cases the aglet must be adapted to be shaped to dimensions to provide an effective obstruction.

Alternatively, the aglet must be made of a suitable material adapted to be bonded or adhered to an obstruction member already sized to be unable to pass through the aperture.

A fourth aspect of the present invention provides a bag or receptacle made according to the aforementioned method. Preferably the bag comprises a pair of flexible agleted cord handles adjacent to an open mouth of the bag.

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The bag may comprise any suitable flexible material such as paper, light cardboard, plastic film or fabric.

Preferably, the bag comprises a pair of obstruction members for each handle, one obstruction member being fixed to each respective free end of the cord.. Alternatively, the bag may include a single obstruction member for each flexible cord handle, such an obstruction member having a pair of cord receiving passageways adapted to be fixed to both free ends of each flexible cord handle.

The free end of the cord may be doubled back on itself before being inserted into the cord receiving passageway of the obstruction member, so that the free end of the cord and the handle are on the opposite side of the bag wall to the obstruction member.

As a matter of choice the obstruction member can be positioned on the interior or exterior side of the bag wall. If the obstruction member is decorative or includes additional advertising material, it may be desirable to have it positioned on an exterior side of a bag.

In a fifth aspect, the present invention provides a method for attaching a flexible cord handle to a bag including the steps of:

forming at least one aperture through a bag wall;

passing an end of a cord having an aglet thereon through said at least one aperture, said aglet comprising detent or barb means biased outwardly thereof which are movable inwardly as the aglet is passed through the aperture and which detent or barb means return to a position outwardly of the aglet to provide a stop preventing removal of the aglet from the aperture in the reverse direction to its passing through the aperture.

In a sixth aspect the present invention provides an aglet for fixing a cord handle to an aperture in a bag wall, said aglet including a longitudinal body part formed with outwardly biased barbs or detent means adapted to retract inwardly as the body part is moved through an aperture during which the barb or detent means contact the perimeter of the aperture.

In a seventh aspect, the present invention provides a method for attaching a flexible cord handle to a bag including the steps of:

forming at least one aperture through a bag wall;

passing an end of a cord having an aglet thereon, through said at least one aperture, said aglet comprising detent or barb means biased outwardly thereof;

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providing at least one obstruction member with at least one aglet receiving cavity therein adapted to receive the aglet of at least one cord, the obstruction member being sized to be unable to pass through the aperture;

inserting the aglet into the aglet receiving cavity of said member so that the detent or barb means are positioned to retain the obstruction member against removal from the aglet.

Preferably, an aglet of the fifth to seventh aspects of the present invention includes an integrally formed stopping surface spaced from the barb or detent means to abut the bag wall at the opposite side of the aperture to that of the barb or detent means when in situ.

The size of the aperture formed through the bag wall is preferably only marginally larger than the largest transverse cross-sectional dimension of the aglet.

The obstruction member provided in accordance with the seventh aspect method may be of many different forms. For example, the cord receiving cavity within the obstruction member may pass entirely through the obstruction member. In such embodiments, the aglet may be positioned some distance away from the end of the cord, and the cord may be passed through the obstruction member until the aglet is located at least partially within the obstruction member. Such an embodiment would provide a length of cord protruding from the obstruction member which may be aesthetically desirable or serve some further useful function.

In other embodiments the obstruction member may provide advertising, for example a company logo printed on the exposed side of the member, or the member may be shaped for the purposes of advertising.

In an eighth aspect the present invention provides a method for attaching flexible cord handles to bags or other receptacles wherein a bag is maintained with a mouth of the bag in an open configuration by means of the application of a partial vacuum to at least one side wall of the bag during which a flexible cord handle is applied to the bag.

Cord handles and their method of attachment applicable to the present invention are as disclosed herein and as proposed in WO97/48550. An alternative form of handle suited to this aspect of the present invention is one wherein a length of flexible cord handle is fitted with elongate stops which extend transversely of the cord and which stops can be aligned

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parallel to the cord to be pushed through apertures in the side wall of the bag before returning to their transverse orientation relative to the cord and so act as a stop which prevents removal of the cord from the bag when the cord is fitted to the bag.

In a ninth aspect of the present invention there is provided a method of fitment of a cardboard or similar base insert into a bag after opening of the mouth of the bag by means of the application of a partial vacuum to at least one side wall of the bag while moving the bag along a pathway whereafter the base insert is placed into the bag and affixed to the interior of the bottom of the bag by adhesive pre-applied to the bottom of the bag and/or to the underside of the base insert. The fitment of a cardboard base into a bag in accord with this aspect of the invention can be readily integrated into the pathway for fitment of handles in accord with the eighth aspect described above with the adding of the base insert to the bag being provided before or after the location at which the handles are fitted or at the handle fitting station.

In one embodiment bags are carried along a pathway so that they are oriented with their mouths uppermost and suction applying means are positioned to contact the exterior of opposite sidewalls of the bag near to the mouth of the bag and draw the bag open via relative movement therebetween while holding a respective bag sidewall under partial vacuum force.

In a tenth aspect, the present invention provides a method and means for fitment of flexible cord handles with pre-applied end stops oriented transversely of the cords as described above. In this aspect a cord is fed to an applying station having means for orienting each end stop in parallel alignment with each adjacent cord section; each end stop then being fed through an aperture in a sidewall of a bag, the end stop being gripped at the opposite face of the sidewall and moved so that each end stop is released and oriented transverse to the axes of the cord on the opposite face or the sidewall, whereafter removal of the cord from the sidewall of the bag is prevented by the stop on the cord contacting the opposite face adjacent the aperture; the largest cross-sectional dimension of the aperture being less than the elongate dimension of the stop.

Brief Description of the Drawings

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

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Figure 1 is a perspective view of a conventional bag/receptacle;

Figure 2 is a perspective view of one embodiment of a bag according to the present invention;

Figure 3 is a cross-sectional view of an embodiment of the invention in which the obstruction member is larger than the aperture in the bag wall;

Figure 4a shows a cross-sectional view of an embodiment in which the obstruction member is smaller than the aperture in the bag wall;

Figure 4b shows a cross-sectional view in which the obstruction member has been deformed to become larger than the aperture in the bag wall;

Figure 5a shows a cross-sectional view of an embodiment in which a heavier duty aglet is used, serving the function of an obstruction member;

Figure 5b shows a cross-sectional view of an embodiment in which a heavier duty aglet has been deformed to become larger than the aperture in a bag wall;

Figure 6 is a diagrammatic part cross-sectional view of a first embodiment of the present invention in situ;

Figure 7 is a diagrammatic part cross-sectional view of a second embodiment of the present invention in situ;

Figure 8 is an isometric view of a half aglet in accord with a further embodiment;

Figure 9 is an isometric view of a schematic arrangement of one embodiment of the interior workings of a handle applying station;

Figure 10 is a view of the embodiment of Figure 9 detailing the cord handle supplying arrangement omitted from Figure 9 for reasons of clarity;

Figure 11 is a cross-sectional view X-X of Figure 10;

Figure 12 is a schematic plan view of a base inserting station;

Figure 13 is a schematic transverse cross-sectional view of a first embodiment of a cord handle applying and fixing station;

Figure 14 is a plan view of Figure 13;

Figure 15 is a perspective view of a form of bag handle suitable for use in the present invention;

Figure 16 is a transverse cross-sectional view of a bag handle applying station for fitment of cord handles in accord with Figure 15; and

Figure 17 is a plan view of the arrangement shown in Figure 1.

Detailed Description of the Preferred Embodiments

As shown in Figure 1, a conventional bag 10 is defined by a plurality of walls 15 with an open upper end 20 and a closed lower end 25.

Adjacent its upper end are a pair of flexible cord handles 30, 40 on approximately opposite sides of the bag. The flexible cord handles 30, 40 pass through respective pairs of apertures 31, 32 and 41,42 in the bag walls.

As per conventional practice, the free ends of the handles are tied in knots 35 (not shown) and 45 on the interior side of the bag such that the ends of handles 30, 40 cannot slide through the apertures in the bag wall and the handle disengage from the bag.

As previously discussed, however, this conventional process is labour intensive, expensive and unreliable.

Figure 2 shows a bag according to the present invention which replaces the knots 35 and 45 with obstruction members 50 fixed to the free ends of the handles 30, 40. The bag 10 may comprise any suitable flexible material such as paper, light cardboard, plastic film or fabric. The free ends of each handle 30, 40 may be doubled back before being inserted into the cord receiving passageway of the obstruction members 50, so that the free ends of the handles 30, 40 are on the opposite side of the bag wall to the obstruction members 50.

Figure 3 shows an embodiment of the present invention, in which a section 31 of the agleted cord handle 30 is in a position to be passed through an aperture 16 in the bag wall 15 and into a cord receiving cavity 51 of an obstruction member 50. The aglet 32, once positioned at least partially within the cavity 51, may then be bonded to the obstruction member 50 by applying sufficient heat to cause bonding. The step of heating the obstruction member 50 may be performed using microwave heating techniques. In cases such as this the heating preferably occurs only within a small part of the obstruction member 50 close to the aglet 32. Such a technique may be desirable for the purposes of speed, efficiency of production, or to minimise heat damage to the cord 31 or aglet 32. Once the aglet 32 and the obstruction member 50 are bonded together, the cord has then been securely attached to the

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bag. The aglet 32 must therefore be sufficiently firmly attached to the cord 31 to hold the cord 31 in place when in use as a bag handle.

Note that the obstruction member 50 is large enough that it is unable to pass through the aperture 16. Note also that the aperture 16 formed in the bag wall 15 is only marginally larger then the agleted cord 31. This means that the strength of the bag wall 15 is less affected by the aperture 16, and also allows a smaller (and hence cheaper) obstruction member 50 to be used.

Figure 4a shows an embodiment in which the obstruction member 50 has dimensions such that it may pass through the aperture 16 of the bag 15. In this embodiment, the obstruction member 50 has been bonded to the aglet 32 prior to passing the cord 31 through the aperture 16. As it is clear in Figure 4a that the objections member 50 will not secure the cord handle 31 to the bag, the obstruction member 50 is subsequently deformed so that it becomes large enough to prevent the cord 31 passing through the aperture 16, as shown in Figure 4b. The deformation may be effected by applying sufficient heat to the obstruction member 50 that it becomes malleable, and then applying a force in order to distort the shape of the obstruction member 50. The obstruction member 50 then cools and sets in the new shape.

Figure 5a shows an embodiment in which the aglet 32 functions as the obstruction member 50. Once again, it is clear in Figure 5a that the aglet 32 will not secure the cord handle 31 to the bag, so the aglet 32 must be deformed so that it becomes large enough to act as an obstruction member and prevent the cord 31 passing through the aperture 16, the end result being shown in Figure 5b.

Clearly, the aglet 32 used in the embodiment shown in Figure 5a and Figure 5b must be of greater mass, in order that it may provide a sufficiently sturdy obstruction once it is deformed such that is dimensions no longer permit it to pass through the aperture 16.

Although the invention has been described with reference to particular examples of the invention, it should be appreciated that it may be exemplified in other forms. For instance, the obstruction member can be positioned on the interior or exterior side of the bag wall. If the obstruction member is decorative or includes additional advertising material, it may be desirable to have it positioned on an exterior side of the bag.

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The cord receiving cavity of the obstruction member may pass entirely through the obstruction member, or alternatively the cavity may intrude only partially into the obstruction member. In cases where the cavity only extends partially into the obstruction member, it is important that the aglet is positioned close enough to the end of the cord that when the cord is inserted into the cavity, the aglet becomes positioned at least partially within the cavity.

In each of Figures 6 and 7 a section through an aperture 60 in a side wall 61 of a bag 62 is fitted with an aglet 63.

In Figure 6 aglet 63 comprises flexibly biased barbs 64 which retract as aglet 63 is pushed through aperture 60 and spring back to their retaining position as shown when they have passed through aperture 60.

The embodiment of Figure 7 incorporates an additional retaining washer 65 interposed between barbs 64 and side wall 61.

The bag handle sections as shown in Figures 6 and 7 include a flexible cord portion to which aglet 63 is affixed.

In an embodiment, each aglet is formed by two halves divided longitudinally as shown by the half aglet 70 of Figure 8. Each half aglet 70 is to be joined to a like half about a cord end. Each half piece 70 preferably includes inwardly projecting gripping barbs or teeth 71 which pass into the cord and hold the cord to the aglet when the two halves 70 are joined together by adhesive or microwave welding or similar.

The handle applying station 80 depicted in Figures 9 and 10 receives bags 81, which are gripped by moveable suction force grippers 82, being moveable under the action of a pneumatic or hydraulic pick and place cylinder 83 which moves to reach out to grip a bag and draw it on to a set of suction grippers 82. A plurality of such gripper sets 82 are mounted on an indexing chain drive system 84.

The pick and place cylinder 83 and its suction grip is withdrawn from a bag 81 once that bag is gripped at a station 82. Movement of the indexing chain drive system 84 to which the bag gripping sets 82 are mounted carries a bag 81 to a cord handle applying station as shown in Figure 11.

At the cord applying station of Figure 11 a predetermined length of cord is furnished. Figure 10 depicts one form of producing a predetermined length of cord which is supplied

from a continuous cord length 85 travelling around cord indexing wheel 16 mounted atop the unit 80. Cord pick-up clamp and cylinder 87 draws a length of cord from the continuous length 85, which is then cut to size by hot wire core cutter 88 to be readied for insertion into bag 81 at the cord applying station of Figure 11. Typically, the form of cord could be as shown in any of Figures 3-5b or of a form as depicted in Figure 15 hereof.

A bag opening suction cup and pneumatic/hydraulic cylinder 89 is activated to open the mouth of bag 82 against the holding action of bag indexing suction cup and cylinder assembly 82. The ends of a length of cord handle are then passed through bag handle apertures formed in the sidewalls of a bag 81 at hole punching station 90 upstream of the handle applying station of Figure 11. The Figure 11 embodiment depicts a moveable heater block assembly 96 for shaping an aglet in accord with Figure 5b. For reasons of clarity, a bag handle applying station is shown in Figures 10 and 11 fitting handles only to one sidewall of a bag whereas the other sidewall can have a handle fitted by an arrangement which substantially mirrors the cord supplying, cutting and fitting arrangement shown in Figures 10 and 11.

At the completion of the handle applying and other optional actions of station 80 each bag is removed from station 80 by means of out place cylinder 95 and its attached suction pad gripper which holds bag 81.

The schematic of Figure 12 shown one arrangement for feeding and fitting a stiff base member or insert to the interior of a bag. A base insert member 91 is supplied from a stack under the action of a servo indexing drive system 92. The topmost base insert 91 is gripped under the action of a vacuum force pick up 93, having a vacuum pad 94. Vacuum pad 94 traverses with a gripped base insert 91 to a location in the path of movement of bags 81 in apparatus 80 where the mouth of bag 81 is open. The base insert 91 is then fitted within the bag 81 as shown in the left hand schematic of Figure 12 under the action of variably displaceable tiltable and placing cylinders 97; the vacuum force of pad 94 is released at a predetermined location within the bag so that the released base insert 91 falls to the bottom of the bag 81 to form a stiffener for the base of the bag. Preferably, the base insert 91 is adhered to the base of the bag, by adhesive located on the interior of the base of the bag or positioned on the underside of base insert member 91. By this means an insert 91 is fixably retained against the base of bag 81.

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Figures 13 and 14 depict in more detail an arrangement where aglets of the form of Figures 5a and 5b are passed through openings in a bag 81 under the action of a cord inserting cylinder 100. Aglet 101 being gripped by cord insertion handling clamp 102 mounted on rotary cylinder 103 adapted to move toward bag 81 under action of cord inserting cylinder 100.

Heating block 104 is inserted into the mouth of bag 81 so that the free end of aglet 101 contacts block 104 within the bag to shape the free end of aglet 101 to a size which cannot thereafter pass out of bag handle aperture 105 in bag 81. In the Figure 14 view, cord insert guide tool 106 is shown which has been omitted from Figure 13 for reasons of clarity.

The cord handle of Figure 15 is formed by a flexible cord section 110 with transverse end stops 111. Such a cord can be supplied as discrete items or as a series of repeated sections on a continuous length of cord fed to a cord applying station which severs the discrete sections before their application as handles to a bag.

The embodiment of Figures 16 and 17 is similar to that of Figures 13 and 14, but in this case a cord handle of the form of Figure 15 is applied by passing respective end stops 111 through apertures 105, which upon their release reorient to lie transversely of respective apertures 105, and of their adjacent section of cord 110. As shown in Figure 16, interiorly of the mouth of bag 81, there is positioned a bag holding clamp assembly 120 to aid the stable positioning of the side wall of bag 81 relative to the movement of end stop 111 under the action of cord inserting cylinder 100.

While the present inventive method and apparatus has been described in relation to attaching flexible handles to bags, it will be understood by persons skilled in the art that the inventive obstruction member, method and apparatus are equally suitable for other types of receptacles for example buckets, boxes, baskets etc with flexible cord handles.

The obstruction member may include advertising material for example the name of the retail outlet providing the bags to its shoppers or may be shaped in the form of a company logo or symbol. The step of deforming the obstruction member may be performed in such a way that the obstruction member provides advertising material or decoration. The use of an appropriately shaped tool to perform the deformation may make this process simpler. Of

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course, in such a case it may be beneficial to position the obstruction member on the exterior side of the bag.

It will be further appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.